

**REMARKS**

This is a full and timely response to the Office Action mailed March 2, 2010 filed concurrently with a one-month extension of time to extend the due date for response to July 2, 2010.

No claims have been amended in this response. Thus, claims 1 and 3-12 are currently pending in this application with claims 3, 4, 6, 7, 11, and 12 being withdrawn. No new matter has been added.

Applicant believes that all pending claims are in condition for allowance. Reexamination and reconsideration in light of the following remarks is respectfully requested.

**Rejection under 35 U.S.C. §103**

Claims 1, 5, and 8-10 have been rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over newly cited Wakayama et al. (U.S. Patent Application Publication No. 2004/0154456). Applicant respectfully traverses this rejection.

To establish an obviousness rejection under 35 U.S.C. §103(a), four factual inquiries must be examined. The four factual inquiries include (a) determining the scope and contents of the prior art; (b) ascertaining the differences between the prior art and the claims in issue; (c) resolving the level of ordinary skill in the pertinent art; and (d) evaluating evidence of secondary consideration. *Graham v. John Deere*, 383 U.S. 1, 17-18 (1966). In view of these four factors, the analysis supporting a rejection under 35 U.S.C. 103(a) should be made explicit, and should "identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed. *KSR Int'l. Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 82 USPQ2d 1385, 1396 (2007). Further, the Federal Circuit has stated that "rejections on obviousness cannot be sustained with mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006). Finally, even if the prior art may be combined, there must be a reasonable expectation of success, and the reference or references, when combined, must disclose or suggest all of the claim limitations. *See in re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Here, in this case, Applicant submits that the Examiner has failed to establish a *prima facie* case of obviousness because Wakayama et al. fails to disclose or suggest all of the claim limitations with particular emphasis on the limitations, “*wherein the formation of the intersection between the scribe line in the second direction and the scribe line of the first direction occurs without the scribe means being pressed against an existing scribe line in the brittle material substrate*” and “*wherein, in the formation of at least one scribe line in a second direction, the scribe means presses against the brittle material substrate at a scribe start position and a scribe stop position which are set at a distance of 0.5 to 0.7 mm from the scribe line of the first direction.*”

In the present invention, the formation of the intersection between the scribe line in the second direction and the scribe line of the first direction occurs without the scribe means being pressed against an existing scribe line in the brittle material substrate. The Examiner asserts that Wakayama et al. discloses this feature in paragraphs [0021]-[0022] (see page 3 of the Office Action). Applicant strongly disagrees with the Examiner’s position.

The cited paragraphs [0021] and [0022] of Wakayama et al. disclose that the cutter wheel tip is caused to jump up when the scribing head crosses existing scribe lines, or passes an undulated or warped part of a glass or an uneven part on a glass surface (see paragraph [0021] of Wakayama et al.). More specifically, when the scribing head runs with the support shaft 86 ahead, the point of contact between a blade ridge 83A of the cutter wheel tip 83 and a glass surface GL is given as point P. At this point P, a reaction force R toward the center of the cutter wheel tip 83 is generated against a resultant force of a frictional force M toward the running direction and a pressure N toward the thickness direction of the glass surface GL. The reaction force R acts on the cutter wheel tip 83, as a turning moment around the support shaft 86. Consequently, the cutter wheel tip 83 is caused to jump up. In this connection, the tip holder tends to pivot about the support shaft 86 and to bounce over the glass surface GL (see paragraph [0022] and Figure 13 of Wakayama et al.).

In other words, Wakayama et al. discusses a problem in the prior art in which during formation of an intersecting scribe line, the cutter wheel tip is caused to bounce up when the scribing head crosses an existing scribe line. The bounce occurs because the scribing head falls down into the crevice of the existing scribe line and then bounces when it hits the far wall of the

crevice (see Figure 13 of Wakayama et al.). Thus, the scribing head is not raised when crossing an existing scribe line as in the present invention. Rather, the scribing head is *pressed against the existing scribe line*. When the scribing head bounces in this manner, the pressure to the cutter wheel tip 83 is cancelled by the reaction force R. As a result, formation of a deep vertical crack is less likely (see paragraph [0023] of Wakayama et al.).

More specifically, because the bounce is a passive action, it can happen unexpectedly, and if it happens, the scribe lines of the second direction are interrupted at the intersections and cannot be formed properly. As explained in detail above, in Wakayama et al, the cutter wheel is caused to bounce up when or after the scribing head crosses existing scribe lines of a first direction. Hence, Wakayama et al. does not disclose that the scribing (pressing) action is suspended from shortly before until shortly after the scribing head crosses existing scribe lines of a first direction.

Therefore, Wakayama et al. aims to solve this problem by raising the scribe pressure temporarily when the scribing head passes an existing scribe line. Preferably, the rotational torque of the servomotor is controlled at any of preset limits while the position of the cutter of the scribing head shifts on the brittle substrate. Also preferably, the servomotor is driven under position-control mode. If this is the case, it is preferable that the servomotor sets a position of the scribing head so as to locate *below a top surface of the brittle substrate*, and substantially at the same time as the start of a scribing action, *the thus set position is lowered further* (see paragraph [0034] of Wakayama et al.). This arrangement can prevent the cutter wheel tip from jumping up when it crosses a raised scribe trace formed in a previous scribing action. This is an effective measure against “skipping of intersections” (see paragraph [0035] of Wakayama et al.).

Thus, neither the prior art discussion in Wakayama et al. nor the disclosure of the invention of Wakayama et al. discloses *wherein the formation of the intersection between the scribe line in the second direction and the scribe line of the first direction occurs without the scribe means being pressed against an existing scribe line in the brittle material substrate*.

As such, Wakayama et al. also fails to disclose *wherein, in the formation of at least one scribe line in a second direction, the scribe means presses against the brittle material substrate at a scribe start position and a scribe stop position which are set at a distance of 0.5 to 0.7 mm from the scribe line of the first direction*. The Examiner concedes that Wakayama et al. fails to expressly

disclose this limitation, but insists that this limitation is still obvious (see page 4 of the Office Action). Once again, Applicant strongly disagrees with the Examiner's position. Figure 13 of Wakayama et al. clearly shows the scribing head contacting both walls of a previously formed scribe line and extending down into the crevice of the previously formed scribe line. Nothing in Wakayama et al. suggests stopping and starting the scribe means at a location spaced apart from an existing scribe line.

According to the present invention, the scribe means is prevented from being pressed against the substrate, from a scribe stop position which is 0.5 to 0.7 mm short of a scribe line of the first direction, to a scribe start position which is 0.5 to 0.7 mm ahead of a scribe line of the first direction. Then, the scribing action is resumed from the scribe start position.

In the present invention, the advance of the vertical crack phenomenon in which a crack extends beyond a stop position of the scribing means and behind a start position of the scribing means is utilized to prevent chipping, chafing, and splintering (see paragraphs [0012]-[0014] of the present Patent Application Publication No. 2006/042433 A1). More particularly, the present invention forms a scribe line of a second direction by a scribe means generating a high-penetration vertical crack (e.g. a scribe means which generates a high-penetration vertical crack in the brittle material substrate by applying impacts of a short period on the surface of the brittle material substrate) by upon the following findings.

(i) When the scribing action is effected (i.e. the scribe means is pressed against the substrate) during which the scribe means reaches and crosses an existing scribe line of the first direction, occurrence of chipping, chafing and splintering is likely at the intersection between the scribe lines; and

(ii) When the scribing action is effected (i.e. the scribe means is pressed against the substrate) until the scribe means reaches 0.5 to 0.7 mm short of an existing scribing line of the first direction, a scribe line advances to the scribe line of the first direction by itself without the scribing (pressing) action.

Based on such-findings, the present invention prevents the scribe means from being pressed against the substrate from 0.5-0.7 mm short of to 0.5-0.7 mm ahead of the intersection with an existing scribe line of the first direction, thereby enabling formation of a scribe line of the second

direction which crosses the scribe line of the first direction, without suffering from defect's such as chipping, chafing and splintering.

Wakayama et al. fails to have any recognition of the advance of the vertical crack phenomenon, and thus, cannot possibly render the present invention obvious. In fact, Wakayama et al. is not concerned about whether the scribe means generates a high-penetration vertical crack, but simply aims to solve a conventional problem in scribe means. Namely, in order to solve a problem that a scribe means is caused to jump up at intersections of scribe lines, Wakayama increases a pressure or pressing force, which is completely opposite to the present invention. Further, the spacing of the scribe start and stop positions from the existing scribe line are chosen in view of the advance of the vertical crack phenomenon. Thus, without recognition of the advance of the vertical crack phenomenon, one of ordinary skill in the art would have had no motivation to press scribe means against the brittle material substrate at a scribe start position and a scribe stop position which are set at a distance of 0.5 to 0.7 mm from the scribe line of the first direction.

In view of the above, Applicant respectfully submits that claim 1 is allowable over Wakayama et al. Further, claims 5 and 8-10 depend directly or indirectly from allowable claim 1, and include all of the features of claim 1. Thus, in view of such dependencies, Applicant also respectfully submits that the dependent claims are allowable at least for the reasons that claim 1 is allowable as well as for the features they recite.

Thus, for these reasons, withdrawal of the present rejection is respectfully requested.

**CONCLUSION**

For the foregoing reasons, all the claims now pending in the present application are believed to be clearly patentable over the outstanding rejections. Accordingly, favorable reconsideration of the claims in light of the above remarks is courteously solicited. If the Examiner has any comments or suggestions that could place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the below-listed number.

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Respectfully submitted,

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